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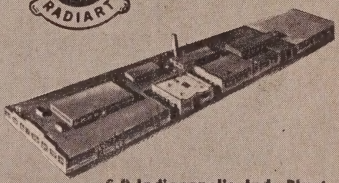

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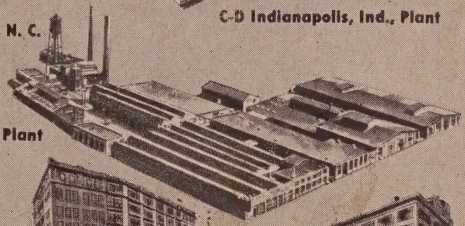

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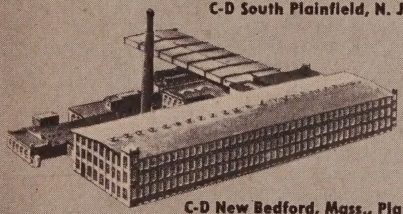

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Vol. 18 DECEMBER, 1953 No. 12

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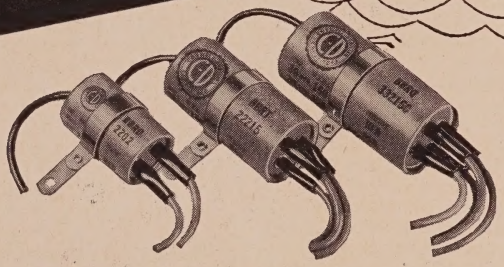

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SIMPLE SIGNAL INJECTORS

The signal-injection method of troubleshooting is rapid and simple. It may be applied to receivers and sound systems with equal facility. While somewhat similar to **signal tracing,** it has an important point of difference: In signal injection, the test signal is introduced at various points into the system under test, starting at the output and working back progressively to the input. The stationary output device (loudspeaker or output meter) indicates transmission or loss of the signal, and thus alerts the operator to the position of dead stages. A defective stage thus can be isolated quickly and static tests then undertaken to find the defective components responsible for the trouble.

A signal source usually is the only accessory required for signal-injection troubleshooting. Audio and r. f. oscillators often are used. This raises the natural question **why build a special injector when oscillators are standard equipment?** The answer is that oscillators and signal generators often are not conveniently transportable to outside jobs. Since signal injection generally requires only a single spot frequency, accurate variable-frequency oscillators may be left in the laboratory or shop. Simple signal injectors can be made small enough to be carried in the pocket, and when transistorized, may even be constructed completely in a probe.

Signal injectors have taken many ingenious forms. Some have been designed for special purposes and have only limited application in general servicing. This article describes several simple injector circuits which can be made the basis of inexpensive instruments that the service technician can build.

Neither of the circuits is critical. They have been made as foolproof as possible and have been thoroughly tested in the author's laboratory. Because they are not critical, the reader is free to satisfy his own preferences regarding layout and packaging.

Audio Injectors

Figures 1, 2, and 3 show injector circuits for use in checking audio amplifiers and the audio channels of receivers and transmitters.

Low-Voltage Battery-Tube Type. Figure 1 (A) is a tickler-feedback-type oscillator arranged for economical low-voltage battery operation. The B battery is a 4½-volt unit and can be one of the small, flat-type units marketed as C batteries. This oscillator lends itself readily to small-sized construction.

The feedback transformer can be any available interstage unit having a turns ratio of 2:1 or 3:1. The low-impedance winding is connected to the plate of the 1LE3 tube, and the high-impedance winding to the grid. The oscillation frequency is determined by the capacitance of C and the inductance of the grid winding of the transformer. Various values of C may be tried experimentally to obtain a satisfactory tone frequency. The lower the capacitance, the higher will be the frequency.

The transformer windings must be phased properly for positive feedback. If oscillation is not obtained when the ON-OFF switch is closed, reverse the leads of the plate winding.

Only the filament battery needs to be switched, since no current is drawn from the B battery when the filament is cold.

The output attenuator is a 2000-ohm wirewound potentiometer. A 0.01-ufd. mica capacitor in series with the upper output terminal isolates the test circuit from the 1LE3 plate voltage, and also prevents short-circuit of the test circuit by the output potentiometer.

AC-Operated Tube Type. Figure 1 (B) shows an a. c.-operated single-frequency audio oscillator and isolating output amplifier. The left half of the 12AT7 tube operates as a phase-shift oscillator; the right half as an adjustable-gain voltage amplifier with unbypassed cathode for degeneration.

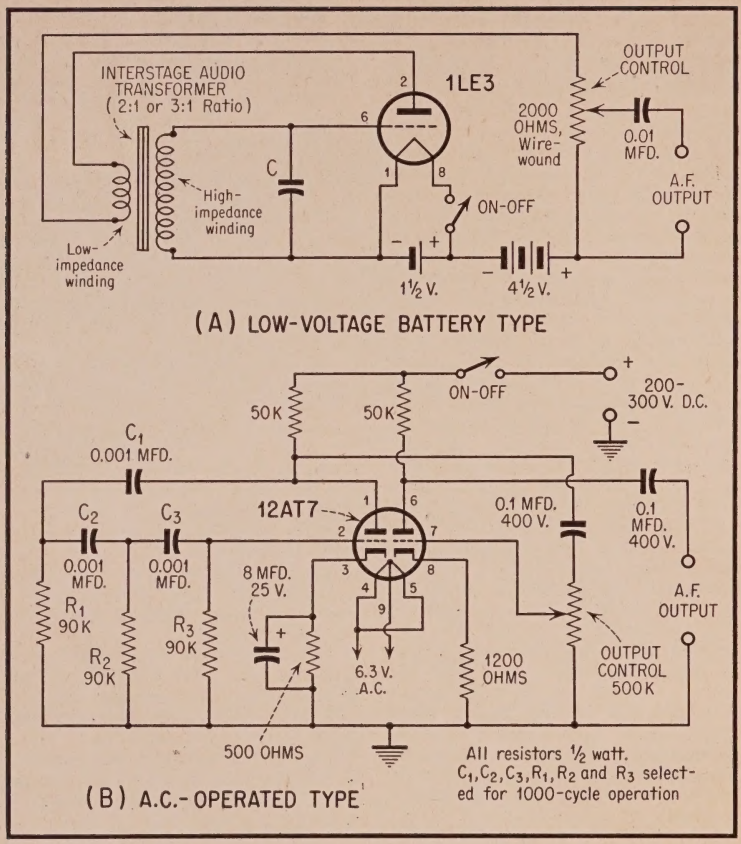


Figure 1.

The phase-shift feedback network has three cascaded sections (C_1R_1, C_2R_2, and C_3R_3). Each section provides 60 degrees of phase shift. The values of capacitances and resistances in this network have been chosen for a frequency of 1000 cycles. Other frequencies may be obtained by changing the values, taking care to keep the three resistances equal and the three capacitances equal. A practical discussion of phase-shift networks and calculations of their R and C values appears in "Practical R-C Circuits" in the November 1951 issue of the C-D CAPACITOR.

The OUTPUT control operates by varying the signal voltage at the grid of the output amplifier. The output circuit is high impedance and accordingly operates most efficiently into high-impedance devices. Ample output-signal voltage is present, however, so that good injection-signal amplitude

is obtained even under the unfavorable mismatch conditions of operating into a low impedance.

A 200- to 300-volt d. c. supply is specified, although the circuit will operate well at 100 volts on the plates of the 12AT7. This must be a transformer-type supply, not the line-operated (AC-DC) variety. The power section may be built on the same chassis as the injection unit. A small-sized power transformer and miniature circuit components may be used for compact, lightweight construction. The power supply is entirely conventional, and the reader can use any suitable components he has available.

Midget Transistorized Type. Transistorized injection circuits provide both small size and economical single-battery operation. This insures the acme of portability and complete isolation from the power line. Present transistors are entirely practical in this application and their expected long life more than offsets present cost.

Figure 2(A) is the circuit of a small-sized, single-frequency transistor audio oscillator. A CK722 junction transistor operates in a grounded-emitter circuit. Tickler feedback is employed between collector and base through the transformer. This latter component is a microphone trans-

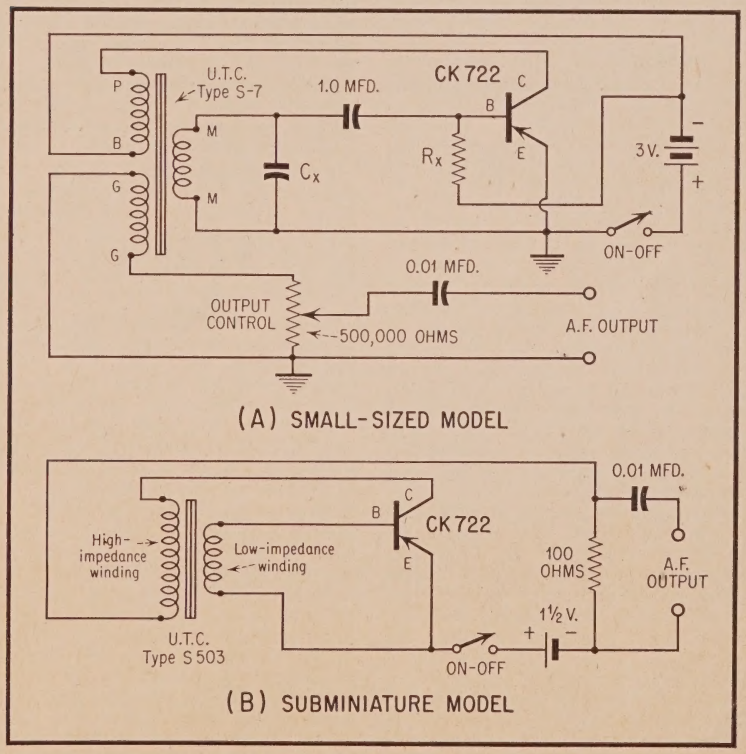


Figure 2.

former (U. T. C. Type S7) having three windings. The third winding conveniently is available for inductive output coupling.

No warmup time is required with the transistor oscillator. Operation starts with the closing of the ON-OFF switch. Transformer windings P-B and M-M must be phased correctly for positive feedback or oscillation will not be obtained. If the circuit does not oscillate when the switch is closed, reverse the connections to the P-B winding. The oscillation frequency is determined by the values of capacitance C_x and the inductance of the M-M winding of the transformer. The frequency will decrease as C_x is increased. No value is specified for C_x, since we do not know what tolerance will be encountered in inductance of the transformer winding. The reader can experiment with various capacitances until a desirable tone frequency is obtained.

The value of the base resistance, R_x, varies with individual transistors and its correct final value must be determined by experiment with the particular transistor used It should be in the vicinity of 100,000 ohms but can be higher or lower. Its value is correct when the d. c. collector current is between 1/10 and ½ milliampere.

The sole voltage supply is the 3-volt battery, which for compactness and portability can be two penlight cells connected in series. It is interesting to note that the circuits in Figures 2(A) and 2(B) will oscillate, but with reduced output, with d. c. supply voltages as low as a few millivolts.

Adjustable output at high impedance is obtained from the 500,000-ohm OUTPUT control. The 0.01-ufd. coupling capacitor provides d. c. isolation for protection of both the injector and the circuit under test.

Subminiature Transistorized Type. In Figure 2(B), the transistor oscillator circuit is similar to the one shown in Figure 2(A), except that a subminiature hearing aid transformer (U. T. C. Type SS03) is used. This latter component and the 1½-volt source (a single penlight cell) permit drastic reduction of instrument size. Because the SS03 transformer has only two windings, audio output is taken capacitively from the collector circuit of the CK722 transistor.

D. C. isolation in the output circuit is provided by the 0.01-ufd. coupling capacitor. If the reader desires, a 100-ohm subminiature wirewound potentiometer can be used in place of the fixed resistor shown, for adjustable output. The ends of the potentiometer winding would be connected as shown for the 100-ohm resistor, and the slider would be connected to the 0.01-ufd. output capacitor.

The circuit oscillates readily when the ON-OFF switch is closed, no warmup time being required, provided the transformer windings are poled correctly for positive feedback. If oscillation is not obtained immediately when the switch is closed, reverse the leads to the high-impedance (collector) winding of the transformer.

By using small-sized circuit components, the audio injector shown in Figure 2(B) can be built completely into a test-probe handle. It also may be built into a flashlight case, using the regular flashlight switch as the ON-OFF.

An important virtue of the transistor is its low d. c. drain. This means that little if any grief will attend forgetfulness in turning the instrument off, provided the inadvertent on time is not too long. In battery-operated tube circuits, on the contrary, such forgetfulness is reflected quickly in A and B battery expense.

Extractor-Type Audio Injectors. Some service technicians, especially those who do no outside work, favor use of a regular signal generator for signal injection. Many shops do not have an audio oscillator, but all have some form of r. f. generator. When the audio voltage from the internal modulator is available at output terminals, the r. f. generator can serve as an audio injector as well. Often, however, this signal voltage is not available and it is not advisable

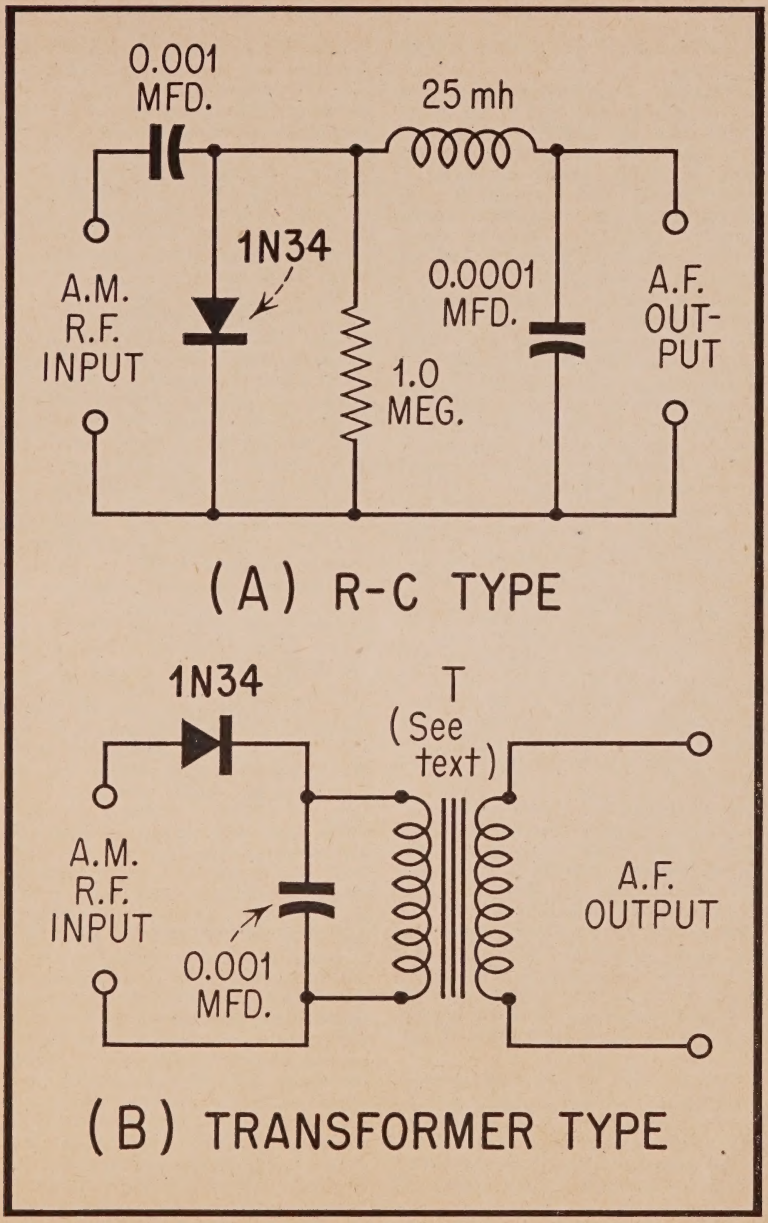

0.001
MFD.
25 mh
1N34
A.M.
R.F.
INPUT
0.0001
MFD.
A.F.
OUT-
PUT
1.0
MEG.
(A) R-C TYPE
1N34
T
(See
text)
A.M.
R.F.
INPUT
A.F.
OUTPUT
0.001
MFD.
(B) TRANSFORMER TYPE

Figure 3.

to tamper with the wiring of the instrument.

Figure 3 shows two extractor-type circuits which will deliver an audio signal from the amplitude-modulated r. f. output of the signal generator. They are simple diode detectors or demodulators. The extractor in conjunction with the modulated signal generator provides a suitable audio injection signal in a simple and inexpensive manner.

Neither circuit can be considered better than the other. They simply use different components and input arrangements. The circuit in Figure 3 (A) is a resistance-capacitance-coupled version, while the one in Figure 3(B) is transformer coupled. They operate equally well and choice undoubtedly will be dictated by which components are available to the builder.

In Figure 3(A), a shunt diode demodulator circuit is employed. This arrangement does not require a d. c. return path for the germanium diode through the signal generator. The 25-millihenry r. f. choke and the 0.0001-ufd. mica capacitor form a radio-frequency filter. The audio output is delivered at high impedance and is proportional to the modulated r. f. input amplitude. The output audio amplitude may be varied by adjustment of the signal generator output attenuator.

In Figure 3(B), a series diode demodulator circuit is employed. Operation of this circuit assumes that the signal generator provides a conductive path between the two extractor input terminals. This path will be provided through the attenuator resistors in the signal generator unless there is a blocking capacitor in the output. If the latter is true, a small resistor (100 ohms or so) must be connected between the input terminals of the extractor.

The detected audio component is transmitted through transformer T. This latter component may be any small audio transformer of the plate-to-line type. The low-impedance ("line") winding is the one connected to the 1N34 diode. The 0.001-ufd. capacitor serves as an r. f. bypass.

Some precautions should be observed in the use of the extractor-type injector shown in Figure 3(B), in order to prevent hum pickup by the transformer. If the transformer is not a well-shielded type, care must be taken to keep it clear of magnetic fields, particularly those arising from the power line or from line-operated components.

R. F. Injectors

Like audio injectors, the radio-frequency signal injector should operate at a fixed frequency. A reasonable choice for general receiver servicing is the 455-kc. intermediate frequency. This will provide a signal which, on fundamental, will check the i. f. channel of the average receiver, and will furnish harmonics for the front ends of both broadcast and short-wave receivers. The r. f. signal injector must be amplitude-modulated, in order that the receiver loudspeaker may be used as an output indicator.

Crystal Type. Figure 4(A) shows the circuit of a modulated 455-kc. crystal oscillator. The i. f. crystal is connected between the plate and grid of a 6C4 triode in an untuned, Pierce oscillator circuit. Adjustment of the 100-uufd. air trimmer capacitor across the 50,000-ohm grid resistor sets the oscillator for quick operation each time the ON-OFF switch is closed.

An ingenious scheme is employed for amplitude modulating the oscillator with a minimum of components. An OC3 regulator tube with a 0.1-ufd. shunting capacitor and 1500-to-3500-ohm variable series resistor form a relaxation audio oscillator circuit which modulates the d. c. plate input of the 6C4 r. f. oscillator. The audio frequency is varied by means of the 2000-ohm rheostat which may be set permanently at any desired tone within its range. The 1500-ohm resistor in series with the rheostat limits the OC3 current to a safe value when the rheostat is at its zero-resistance setting.

Any small power supply delivering 200 to 250 volts d. c. at 60 to 75 ma.

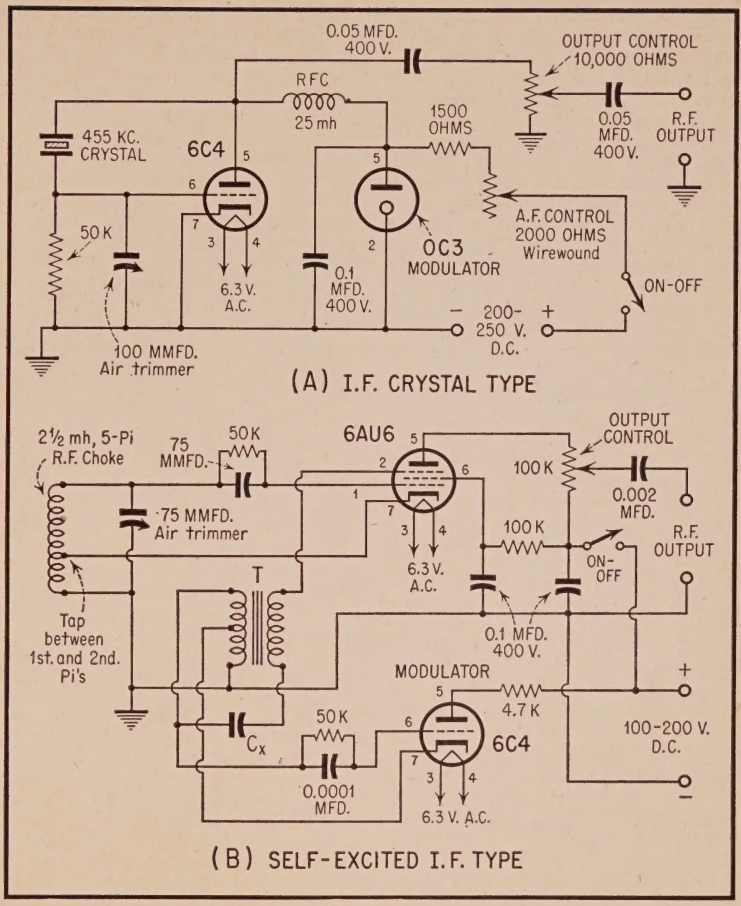


Figure 4.

may be used. However, it must be of the transformer type and not a line-operated (transformerless) voltage doubler. The power supply can be built on the same chassis as the injector. Since it requires no special design or treatment, the power supply is not shown in either of the schematics, Figure 4(A) or Figure 4(B).

High-impedance output is provided. However, ample output signal is available so that satisfactory amplitude can be obtained even when injecting a signal into a low impedance.

Self-Excited Type. The r. f. injector circuit in Figure 4(B) employs a self-excited 455-kc. oscillator instead of a crystal type. A 6AU6 is used in an electron-coupled circuit. Amplitude modulation is supplied by a 6C4 Hartley audio oscillator transformer-coupled to the suppressor of the 6AU6.

Transformer T may be any convenient unit of the type intended to couple pushpull plates to a low-impedance (200 or 500 ohm) line. The audio frequency is determined by the values of capacitance C_x and the inductance of the entire center-tapped primary winding. The larger the capacitance, the lower the frequency. With an available transformer, the reader may experiment with a number of capacitances in order to obtain the desired tone frequency. If the audio amplitude is so strong as to block the r. f. oscillator, the 4700-ohm 6C4 plate resistor may be increased with a given transformer.

The radio frequency is determined by the parallel resonant circuit formed by the 2½-millihenry r. f. choke and the setting of the 75-uufd. air trimmer capacitor. The circuit is tuned to 455 kc. with the trimmer about one-half meshed. The cathode tap for the 6AU6 is taken between the 1st and 2nd pi's at the ground end of the choke.

Capacitor - isolated high - impedance output is provided, but sufficient output signal is present for good amplitude when injecting signals into low-impedance circuits.

The d. c. power supply may be any convenient transformer-type unit sup-

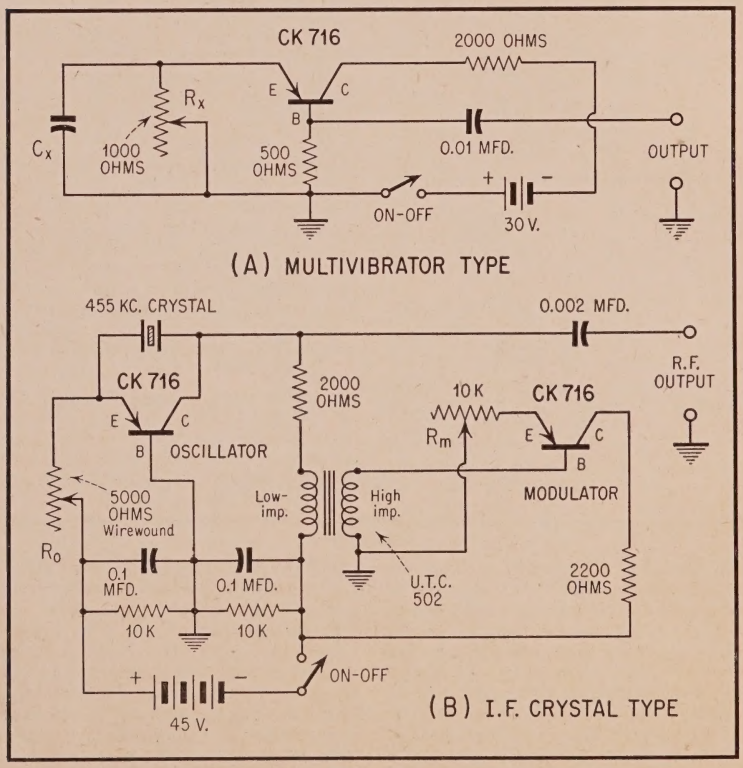


Figure 5.

plying 100 to 200 volts at 50 ma. There is nothing critical about its design, therefore no particular layout is shown here. The power supply components can be mounted on the same chassis as the injector.

Transistorized Multivibrator. Figure 5(A) gives the circuit of a simple transistorized multivibrator which can be used as an r. f. signal injector. When operated between 5 and 10 kc., a multivibrator gives harmonics so closely spaced as to produce somewhat of a broad interfering signal from the low end of the standard broadcast band up into the short-wave spectrum. Such a signal can be used for quickly testing a set, without tuning. If the multivibrator frequency is low enough, the i. f. and audio channels also may be checked with its output.

A CK716 point-contact transistor is employed. A junction transistor will not operate in this circuit. A single 30-volt battery is used and can be the small-sized type designed for hearing aids. Output is taken across the 500-ohm base resistor.

Oscillation results from positive feedback voltage developed across the base resistor, since there is no phase reversal in the grounded-base transistor circuit. The frequency is determined largely by the value of capacitance C_x and the setting of the 1000-ohm emitter rheostat. Since the internal emitter-to-base resistance of the transistor shunts the R-C circuit and varies with transistors, a definite specification of C_x is difficult. With a 0.002-ufd. mica capacitor at C_x, adjustment of the 1000-ohm rheostat, R_x, should allow an individual transistor to oscillate at about 10 kc. Reduction of C_x will increase the frequency. C_x should be a good-grade mica component.

Transistorized Crystal-Type. The circuit of the modulated i. f. crystal oscillator in Figure 5(B) may be regarded as a transistorized version of the tube-type 455-kc. unit (Figure 4A). This circuit is intended for use with point-contact transistors (CK716 or equivalent) and will not work with junction transistors.

The i. f. crystal is connected between collector and emitter of the left transistor in a manner analogous to the vacuum-tube Pierce oscillator. Emitter and collector voltages for this transistor are derived from a voltage divider comprising two 10,000-ohm resistors in series. A single 45-volt battery is the d. c. source.

The right transistor is a base-tuned audio oscillator which supplies the a. f. modulation to the crystal oscillator. Audio energy is coupled into the r. f. stage through the miniature transformer (U. T. C. Type SO2). The audio frequency is determined by the inductance of the high-impedance winding of this transformer and any capacitance in parallel with it. The distributed capacitance of this winding plus circuit capacitances produce a frequency of about 5000 cycles. This frequency may be lowered by means of an external capacitor connected from base to ground at the modulator transistor, to satisfy individual preferences.

Strength of the audio modulation amplitude is adjusted by means of the rheostat R_m. Audio waveform is affected somewhat also by this adjustment. R. F. amplitude, and readiness of the oscillator to start when the d. c. is applied, is controlled by adjustment of the rheostat R_o.

The injector operates most efficiently into high impedances. Ample signal amplitude is provided. In many instances, direct physical connection is not required, sufficient signal being injected into the circuit under test by pointing the "high" output test prod closely to the test point in the circuit.

Electromechanical Injector

A small "watchcase" high-frequency buzzer makes an extremely simple general-purpose signal injector. Electromechanical in operation, it requires neither tubes nor transistors. It sets up a broad interfering signal which is effective in the injection testing of audio and r. f. circuits. Its effects can be noted even at television front-end frequencies.

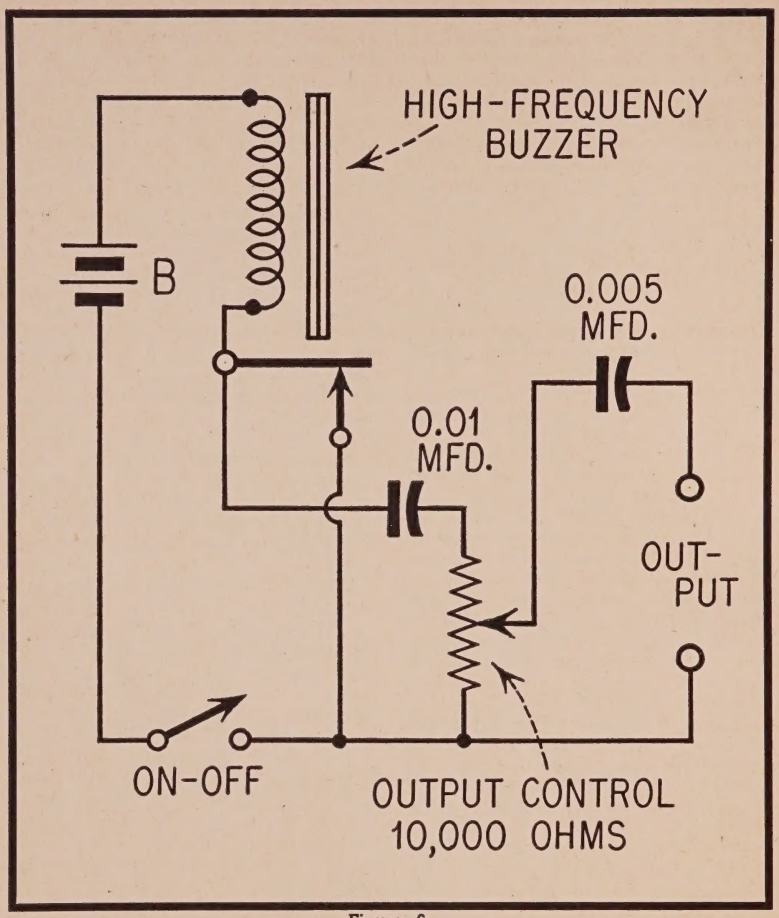


Figure 6.

Most small buzzers operate with battery potentials between 3 and 6 volts. On direct connection, the output-signal amplitude is rather high, and the output control shown in Figure 6 is necessary.

The output is d. c. - isolated by the 0.005-ufd. coupling capacitor. The 0.01-ufd. capacitor prevents short-circuit of the buzzer contacts by the OUTPUT CONTROL potentiometer.

A disadvantage of the buzzer as a signal injector is its acoustic noisiness. But there is some possibility of enclosing the device in a soundproofing jacket of some kind, such as heavy sponge rubber or thick felt.

Diode Noise Probe

A silicon diode operated with d. c. reverse current generates steady r. f. noise which is effective up to several

hundred megacycles. Easily-obtained diodes, such as the 1N21 and 1N21B, can be used for this purpose but germanium diodes are unsatisfactory. This noise signal, being broad and requiring no tuning either of the receiver or noise generator, is very convenient for injection testing of receivers.

Figure 7 gives the circuit of a simple silicon-diode noise generator which can be built as a small probe. The 50,000-ohm rheostat is the noise level control, maximum noise output corresponding to minimum-resistance setting of this control.

The noise probe feeds into the antenna input terminals of the receiver under test. When the receiver does not provide a. d. c. return path for the diode (as might be the case when an input blocking capacitor is present), a resistance R_L equal to the receiver input impedance must be temporarily connected across the probe output terminals as shown.

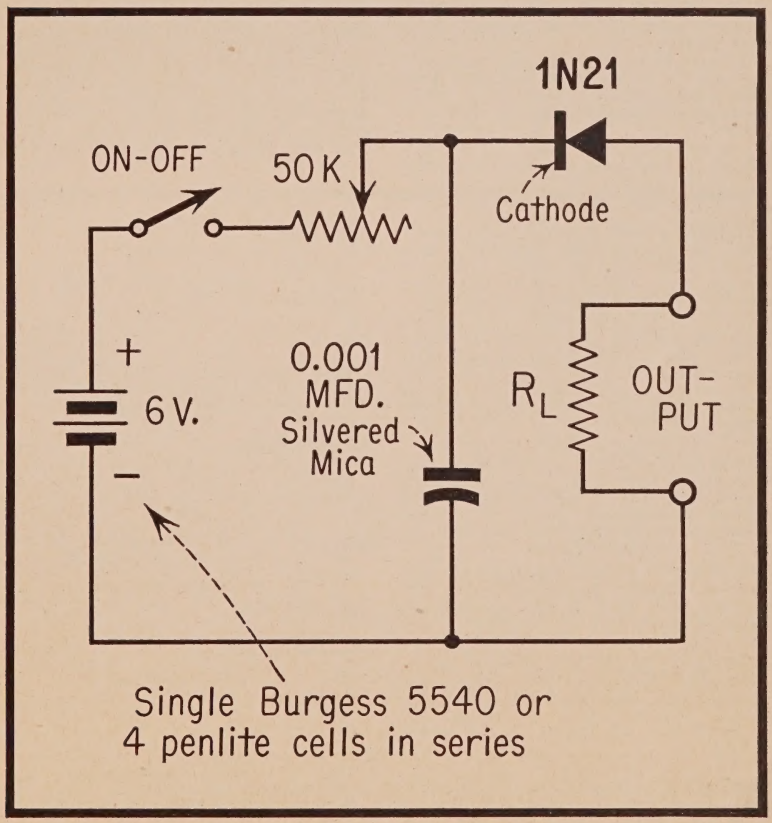
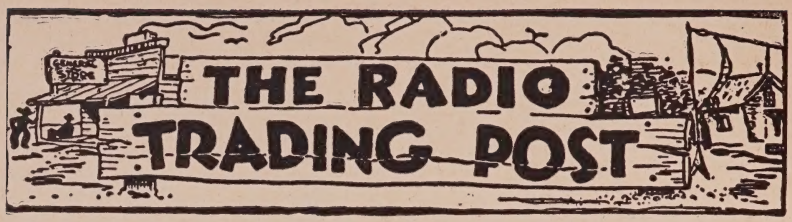


Figure 7.



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FOR SALE — Back issues Radio TV News 1950, 1951; Radio Electronics 1951 thru 1953; Service 1950 thru 1953. 25c per copy, postpaid. Write for list. Cheri's Radio-TV Service, 1865 15th St., Wyandotte, Mich.

WANTED — 40 and 80 meter coils, circuit diagram and operating manual for Meck T60-1 Transmitter. George W. Moran, 8059 88th Ave., Woodhaven, 21, L. I., N. Y.

SWAP — Series 844 Precision VOM, 24 ranges; Model 535 Supreme scope 3", for good 35 mm. camera, or cash. Louis Siegel, 563 East 94th St., Brooklyn 36, N. Y.

FOR SALE — Two large 115 v. AC, 60 cycle Selsyns, one mounted in cabinet with pointer and compass dial, $20. C. Shoreys, Winkle Point Drive, RFD 2, Northport, N. Y.

WANTED — Model E-400 Precision TV-FM sweep gen. Will pay cash. John A. Kimm, 934 Judson St., Evansville 13, Ind.

WANTED — 304TL's or electrical measuring equip. Have Willard ER-6-2B storage batteries. W. Slack, 3038 Addison St., Chicago 18, Ill.

FOR SALE — T-22 ARC 5 (7-9.1 mc.) Xmitter $15; matching modulator $7; BC-451 control unit. A. T. Smith, 2653 Dearborn St., Salt Lake City, 6, Utah

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FOR SALE — Motorola table radio $3; Zenith portable radio $6. J. Willis, 271 S. Washington St., Wilkes Barre, Pa.

WANTED — 16 mm. box-shape movie camera with lens for ham TV camera experiments. Shutter mechanism doesn't matter. Will swap in excess of value or buy for cash. David Gnessin, 64 Mt. Joy Place, New Rochelle, N. Y.

WANTED — New or used in perf. shape WE 262A or B tubes. Have tubes to trade: WE300B, 350B, 310A, 274A, 274B, WE261A, 284D, 211E. H. H. Harrison, 300 37th Way, Sacramento, Calif.

SWAP OR SELL — RF Ammeters, field telephone sets in leather cases, UTC power XFMR 422. Want good tape recorder. D. Pomers, 401 Schenectady Ave., Brooklyn 13, N. Y.

SELL OR SWAP — Channel 217 UHF converter and VEE DX Antenna $15. Estes O. Terry, Starkey, Va.

WANTED — Riders manuals to begin set. State price, cond., and numbers. Electrical Service Appliance Co., Box 528, Mechanicville, N. Y.

WANTED — Mint or used U. S. and foreign stamp collections for radio parts and ham gear. Send stamps or lists. Robert N. Boulle, 236 Sixth Avenue, Long Branch, N. J.

FOR SALE — Riders 1-5 abridged, 8, 11 to 16, like new, $65; BC-455B, exc. cond., $10, postage extra. Robert Franke, R D 1, Oley, Pa.

FOR SALE — Altec Lansing 604C spkr., A-1 cond., make offer. C. B. Parkinson, 431 N. Encinitas, Monrovia, Calif.

WANTED — Hallicrafters model S-72 portable radio, 4 band, 540 kc to 30 mc., must be in A-1 cond. — cash for same. Charles S. Brotzman, 173 Main St., Mexico, Me.

SELL OR TRADE — Riders TV manuals 1, 2, 6, 7, 8, $50; used 12 AP4, $10. R. and M. Television, 284 Morris Ave., Elizabeth 3, N. J.

FOR SALE — Solotone coin operated radio system, 12 individual boxes, and four channel tuner; Heath tube tester and Vac. Voltmeter, complete instructions. Reasonable offer acepted. E. H. Huber, 31 N. Stenton, Atlantic City, N. J.

WANTED — Multimeter. Have Sams Photofacts, radio, TV, phonograph and radar books, tubes, permanent needles, 40' TV mast. William Bashta, 19447 Keswick St., Reseda, Calif.

TRADE — National Schools radio and TV home study course, for U.S. and foreign stamps, or typewriter. Joseph Palmer, 786 East 94th St., Brooklyn 36, N. Y.

SWAP — Hallicrafter S-72 portable unit just returned from Hallicrafter field service lab, mechanically perf., cabinet fair. Will trade for Hallicrafter S-40 or similar rcvr. Thomas T. Smith, 1510 6th St. South, Fargo, N. D.

SELL OR TRADE — Blond Brush BK 411 tape recorder, perf., $100; portable wire recorders with Webster and St. George drive and home built amps., $45 and $35. All in good working cond. F. Schwarz, 17 Woodbridge Dr., Stamford, Conn.

TRADE OR SELL — Tubes, I.F. Transformers, condensers, output transformers, chassis, testers, replacement guides, 8 vols. of Sams Photofacts, Troubleshooters handbooks, etc. Earnest Couch, 1805 College St., Decatur, Ala.

WANTED — Viking II XTR; two meter XTR and rcvr. 522; two meter gear running high power. W2HNG, Box 131, Jamaica, L. I., N. Y.

FOR SALE — Superior AM sig. gen. model 1230; National Electronics VOM; Dayrad tube tester, good for older tubes or parts. Lloyd Ereckson, 416 4th Ave., NW, Jamestown, N. D.

WANTED — Meissner model 9-1065 radio-phono-recorder-PA system chassis, without carrying case, panel board. Not particular about cond., if it can be repaired. Alexander's Radio Service, 3511 Church St., Greensboro, N. C.

FOR SALE — BC-348, power supply, spkr., instruction bk. $55; HRO M (needs aligning), $45; Hallicrafters Hi-Fidelity radio, 25 w. Hi-Fi amp. Hi-Fi spkr., cabinet, changer $80; AVR 7H heavy-duty, three-band aircraft rcvr., $10. Vladimir Algin, 107 Abbott St., Staten Island 5, N. Y.

FOR SALE — Pentron two-speed tape recorder, Magic Eye amp., spkr., tan case, mike, 3 7" tapes, $89. T. Fortman, 9010 N. Laramie Ave., Skokie, Ill.

FOR SALE — Eico VTVM, never been used, $39. James Romine, 717 W. Santa Barbara, Los Angeles 37, Calif.

SELL OR SWAP — Model D General Industries phonograph motor, 33⅓ and 78 RPM, governor control, gear drive, all necessary accessories, 10" turntable. Make offer or what have you? H. W. Gould, 422 North 6th Ave., Portsmouth, Va.

WANTED — "Electrolytic Capacitors" by Paul McK. Deeley. Kenneth G. Alley, 311 S. Oakland Ave., Carbondale, Ill.

FOR SALE — Disc recorder $45; ham transmitter 360 w. $75; miscellaneous radio tubes and parts. Jerry Oddo, 67 - 29 Kissena Blvd., Flushing, N. Y.

FOR SALE — Feiler Electroscope model TS-8, tests all electrical appliances, accessories, motors, receptables for appliances and built-in continuity tester. A-1 cond., complete instructions $17 Arnold M. Herman, 540 N. Lawndale Ave., Chicago 24, Ill.

FOR SALE — Emerson FM rcvr., $8; 8 w. audio amp. in cabinet, $8; 3 Weston Sensitrol relays, $20; Weston Photronic cell, $2; test equip. and tubes. O. Hergenhan, 503 S. 15 St., Newark, N. J.

FOR SALE — Hammerlund HQ-129-X comm. rcvr with matching spkr., perf. cond., $125. Dick Naney, 1235 Wood St., Dubuque, Iowa.

TRADE — Pair "Handi-Talkies" BC-611-C, 5500 kc., exc. cond.; or 10x70 binoculars in good cond. Want 2-speed, 2-track tape recorder with playback, in A-1 cond. W. G. Young, Jr., 1846 - 17th St., SW, Allentown, Pa.

SWAP — Want 12" (minimum) TV. Have 15 w. audio mod., TVI proof Hammarlund 4-20 XMTR., homemade comm. rcvr. Prefer local. C. F. McHenry, 2460 Davidson Ave., Bronx 68, N. Y.

SWAP — ARC 5 rcvr., 1.5 to 3 mg., exc. cond., with dynamotor, for set of 20 meter coils for National FBX rcvr. Hudson Radio Service, 523 State St., Hudson, N. Y.

WANTED — Copies of Scott News., especially ones containing details on Scott Philamonic rcvr.; also Scott catalogs. L. Marks, 14 Avenue Road, Kingston, Surrey, England.

SELL OR TRADE — 8x10 Eastman D-2 view camera, fiber carrying case, 6 film holders, heavy duty tripod; 8x10 crown printer; 4 1-gal. dev. tanks, porcelain; 12 film hangers. Want tape recorder or Omega enlarger. Tronson and Runyard, Sound, Lake Villa, Ill.

FOR SALE — Millen type 90651 grid-dip meter, like new, coils in rack for 1.7 to 300 mc., $30, postpaid. Rufus P. Turner, 919 E. 116th Place, Los Angeles 59, Calif.

FOR SALE — Feiler sig. tracer TS-1 with instructions $5. Paul J. Wesner, Box 231, Green Ridge, Pa.

WANTED — Crater Lamps, for Jenkins model R-400 60 line Radiovisor, will pay cash. J. Carroll, 33 Concord St., Jersey City, N. J.

FOR SALE — Precision E-400 sweep gen., perf. cond., all leads and instructions, original carton, best offer over $85, shipped express collect. Stephen Plauski, 425 - 3rd St., Brooklyn 15, N. Y.

SWAP — Approx. 8500 ceramic condensers, values from 1000 to 5000 mmfd. for standard brand TV and radio tubes. Joseph Rothbart, Expert TV Inc., 955 Ogden Ave., New York 52, N. Y.

FOR SALE — Model 0-8 Heathkit scope, expertly wired and thoroughly tested, $49 COD. Robert Burns, 28 N. Highland Ave., York, Pa.

WANTED — Two smoothing and two swinging chokes, 500 ma. and 7500 v. insulation; also two 15 amp. variacs. Send price and specifications. Donald F. Cameron, 1619 Milburn Ave., Toledo 6, Ohio.

SELL OR TRADE — Electro Voice TV booster, model 3000 $25; Astatic model CT-1 booster, $15; NRI model 33 sig. tracer, $30. Want RCA model WV-77A Voltohmyst or other VTVM. Obern Vandver, Wise, Va.

FOR SALE — Hallicrafter SX-71 rcvr. and matching spkr., used less than 20 hours. Make offer. Ole Lund, Box 383, Roseau, Minn.

WANTED — Hickok Mutual Conductance tube tester with tube life and noise test features. Will sell or trade Weston 774-5 tube tester and set analyzer. Roy E. Cauble, 114 - 44 226th St., Cambria Heights 11, N. Y.

FOR SALE — Precision E-400 sweep gen., never used ,still in guarantee $100; 18 vols. Riders Troubleshooter Guides with indexes, $70; 522 transmitter without 832, $10. H. Gathercole, 45 Aberdeen Drive, Huntington, N. Y.

FOR SALE — BC-1335 FM transceiver, 27-39 mc., 6 or 12 v., exc. cond., tech. manual, also complete set of 120 crystals, $75 or best offer. R. L. Ludlum, 824 San Miguel Road, Concord Calif.

FOR SALE — Precision sig. gen. E-200-C $45; Triplett TV-Marker mod. 1235 $17.50; Scope Probe, Hickok type 34 crystal, $5. All items in exc. cond. H. F. Buchanan, 2729 W. Main St., Louisville 12, Ky.

FOR SALE — Webster 156, GE cartridge and preamp., $15; Radio Craftsmen RC-10, $75; RC-2 amp., $25; Hallicrafters S-38, $28. Norman W. Tetenman, 2350 East 27th St., Brooklyn 29, N. Y.

FOR SALE — Triplett sig. tracer model 2432, $25; Heathkit batt. eliminator BE-3 assembled, $25. Both perf. cond. and FOB. DeVoe Radio Service, Box 414, Spring Green, Wis.

FOR SALE — Practically new model 0-8 Heath scope, completely assembled. Pat Hill Co., 129 Norfolk Ave., Norfolk, Neb.

WANTED — 1½ A-90 B Eliminators; 2 v. eliminators, 6 v. eliminators. Many items to offer in exchange. E. G. Bartlett, Atlanta, Mo.

TRADE — BC-453, 454, 455 rec. and rack; BC-357J, 357E rec.; panel meters, turntable and pickup Astrograph. Want old guns and rifles Jap or German. Thomas Rohland, 834 Penna. Ave., Huntingdon, Pa.

FOR SALE — Eico scope 425 push-pull deflection plenty of gain, hardly used, $35. Alex Siegel, 1516 Shakespeare Ave., Bronx 52, N. Y.

SELL OR SWAP — BC-348 rcvr., fully converted for Hi-Fi equip., Garrard 3-speed changer, good preamp., midrange horn and driver for 3-way system. G. L. Ottinger, 430 Raymond Street, Chevy Chase, Md.

SELL OR SWAP — 6-string Gibson Hawaiian Electric Guitar, exc. cond., $65, or for a good tube checker, or what have you? Prefer local contact. Murry Liebowitz, 360 - 95th St., Brooklyn 9, N. Y.

FOR SALE — Complete low power amateur radio station. Receiver Hallicrafters S40-A, Hallicrafters HT6 25 w. telephone-telegraph transmitter, complete with mike, coils, and meters. External vfo or eco operation possible, $200. SH 14703 Cpl. M. Makarchuk, C/O Army Signals Station, Shilo Manitoba, Canada.

FOR SALE — Hickok model 202 VTVM; 3" RCA scope, model 155A, both in very good cond. Make offer. Stathis G. Linardos, 190 Wadsworth Avenue, New York 33, N. Y.

FOR SALE — CRM-46153 Comm. rcvr., freq. range, 240 kc., - 2000 kc. in three bands inc. broadcast, shock mounted cabinet, good cond., $40. J. A. MacMillan, 36 River St., Ballardvale, Mass.

FOR SALE — Pilot tuner FM rcvr. with cabinet, perf. cond., $20. J. R. Blundin, 214 W. 2nd St., Mt. Carmel, Pa.

WANTED — Midwest radio rcvr. model 18-36, made in 1935. Need not be in working cond., less spkr., no cabinet. State Price and cond. Precision Service Co., 2 N. Quincy St., Brockton 58, Mass.

FOR SALE — Eico 5" scope like new, $30. Trade for 7" scope. John A. Kimm, 934 Judson St., Evansville 13, Ind.

SELL — Never used approved A-200 sig. gen. and instruction book $25 cash or swap for clean well-cared-for S-20R rcvr. Also interested in CCS-rated transformers and parts. Eddie Howell, Box 126, Lumberton, N. C.

SALE — DuKane Tape Recorder, 7½" speed, fast forward and reverse, 50 to 8500 cps., Xtal mike, uses 5" and 7" reels of tape, dual track $120. A1 cond. Hal Gold, 209 S. 3rd St., Brooklyn 11, N. Y.

SELL OR TRADE — Keystone 8 mm proj. Model C8 300 w. with case. Want VTVM, Eico, or Heathkit. Sidney Goldstein, 2129 76th St., Brooklyn 14, N. Y.

WANTED — Back issues of "Photofact Index and Technical Digest," 1950 to July, 1953. Also diagrams of audio amps. and lab. equip., such as power supplies, etc. Sheldon Shostack, 1010 Hegeman Ave., Brooklyn 8, N. Y.

TRADE OR SELL — Hickok 288X; ED-100 VTVM; Precision 910 tube checker; RCA 16GP4 pix tube; BC-412B radar scope; Emerson 602 FM set; Philco sig. tracer. Want cash, 5" scope, TV sweep gen.; 209 Ammeter. John Pellock, 227½ W. Cook, Springfield, Ill.

WANTED — Oscilloscope for exacting audio application, vert. amp. flat from 40 to 20,000 cps. Cash or trade tape recorders, stereophonic equipment and records. Herb Heller, 2121 Renrock Rd., Cleveland 18. Ohio.

WANTED — Hi-Fi equip., tuner, turntable, spkr., spkr. enclosure, Williamson amp. Will swap cameras, photo equip. Martin Herbstman, 97 - 25 64th Ave., Rego Park, Queens, N. Y.

WANTED — Rek-O-Kut 16" turntable 33 & 78 rpm with Hysterisis Sync motor or model G-2 or B-16H. Must be in good cond., L. J. Schnedorf, 610 Monroe Ave., River Forest, Ill.

SELL OR SWAP — Like new BC 348K receiver with commercially built power supply for good tape recorder, 20-40-80 meter coils for Collins 30J - 10-20 beam and rotators, or what have you. L. Meister, 5 Highfield Lane, Nutley, N. J.

WANTED — For C-D, RCA type AVT-112A, AVR-20A, AVA-126A, or equivalent. Equipment must be good & priced right. Center TV Co., 867 Broad St., Central Falls, R. I.

FOR SALE — RCA 156 Scope, good cond., complete with test leads, $30. P. N. Sansosti, 2229 Kentucky Ave., Baltimore 13, Md.

WANTED — FM Pilotuner, model T601 in fair cond. State price. R. W. Granville, Dravo A-408, Lehigh U., Bethlehem, Pa.

SELL OR TRADE — Master Mobile antenna with 80 meter loading coil & Jr. mount less spring. Best cash offer or ham equip. takes it. Theodore Fine, 3139 Godwin Ter., Bronx 63, N. Y.

TRADE — Eicor model 42S scope, Eicor model 360 sweep gen. for speed graphic 2¼" x 3¼" or 4" x 5" camera. Chuck's Radio Service, 123 S. 13th St., Clarinda, Iowa.

FOR SALE—McMurdo-Silver 904 Capacitor and Resistor Bridge $12. Paul F. Bahr, 1013 Indiana St. SE, Albuquerque, N. M.

FOR SALE — Book, Modern Radio Service, 1st ed., like new $3 postpaid. Herman, 25 - 95 41st St., Astoria 3, N. Y.

FOR SALE — 10" Silvertone walnut plastic table model 9125-B TV set, 21 tubes, very powerful, good cond., $36, express charges collect. Jones Radio Co., 1115 Rambler Ave., Pottstown, Pa.

TRADE — Hallicrafters 7" TV, needs little work, for "Carrier Call" inter-coms., must work on line current or tube tester in oper. cond. Peter Shavel, 332 Maujer St., Brooklyn 6, N. Y.

FOR SALE — Sterling Emission tube tester; also Philco AM sig. gen., $10 each FOB. Agostino, 223 S. Winebiddle Ave., Pittsburgh 24, Pa.

WANTED — Man thoroughly experienced in radio and TV servicing, must fix them all. Must be honest and have best references. Wyatt Appl. Co., 406 N. Pine St., Searcy, Ark.

SELL OR SWAP — Cornell-Dubilier model 110RT35 converter 500 w., Electronic Ind. model 204 conv. 150 w., Electronic Devices model A-50 conv. 50 w., slightly used, exc. cond., cost $175. Like tape recorder or what ?? David J. Weisenfeld, 420 West End Ave., New York 24.

FOR SALE — NRI model 55 scope and R-C tester $130. S. Gentile, 206 Wood, Hatboro, Pa.

FOR SALE — $50 for complete 10 m. portable mobile rig, Linx police xmiter complete with control box, cable and bat. cable, Gonset 10-11 conv. with noise limiter. All good cond. Gilbert Watson, 3008 Sansom Ave., Alabama City, Ala.

FOR SALE — Supreme Audolyzer, model 562. Misc. parts and tubes. Ideal set-up for starting small business, retail value of tubes and parts $350. Sacrifice for $95. Trade for RS/ARN7 or BC 433 radio compass. Rudolph Fannon, 7607 Kitty Hawk Ave., Los Angeles 45, Calif.

TRADE — Cornet and music course and Webster-Chicago wire recorder for TV or 16 mm. projector. Herbert Hoch, 418 E. 53 St., Brooklyn 3, N. Y.

WANTED — 16 mm movie sound projector, amp. optional, 12BP4 pix tube in good shape, or any 12" pix tube to replace 10BP4 tube. Have TV items and cash. John Arnold, Box 84, Bluffs, Ill.

FOR SALE — Precision E-200-C sig. gen., Precision 1020-P tube and set tester, Supreme 574 VTVM. Guaranteed like new. All three $140. W4LAF, 460 N. Limestone, Lexington, Ky.

SELL OR SWAP — Heath 0-6 scope A-1 factory calibrated, for Heath 0-9, shipped to me from factory; Meck 7" TV, A-1; RME Preselector model 08-20; Starrett "Ambassador" TV, table model, $50. Robert Peters, Lincoln Way, W., Ext., Massillon, Ohio.

WANTED — Sweep gen., have Heath sig. tracer, 3 years back issues of R.N. and Elect. C.R.O. tube plus other radio parts and tubes. I. P. Chipman, Rt. 9, Box 368, Tuscon, Ariz.

SELL OR SWAP — 150 battery tubes — 1J6, 1C7, etc. Want late model test equip., or sell to best offer. Kruse TV Service, 804 Linwood Ave., Valparaiso, Ind.

REPAIR SERVICE — All makes test equip. repaired and calibrated by factory staff. Ship instr. postpaid, insured, immediate service. Douglas Instrument Laboratory, 176 Norfolk Ave., Boston 19, Mass.

SELL OR SWAP — Hallicrafter S38 comm. receiver and GE 3-way AC-DC-battery portable receiver. Want sig. gen. or cash. No reasonable offer refused. F. J. Mangiere, 9407 - 75 St., Ozone Park 16, N. Y.

FOR SALE — Heathkit TS2 sweep gen. Perf. working cond., $45. Ship FOB. D. Weiner, 3012 Nash Pl. SE, Washington 19, D. C.

FOR SALE OR TRADE — Transformer, half wave, 115 v. primary, 3200 v. secondary, 300 ma. and camera Rolleicord reflex. Gene Beirne, Box 206, Roxbury, N. Y.

FOR SALE — Heathkit vacuum tube volt ohm meter, fair cond., needs calibration. Asking $20, instruction book included. William A. Borras, 731 Avenue "B", Westwego, La.

SELL OR SWAP — Pair GE Selsyns model 2J5A2, Ingersoll-Rand size OO 20000 hand air grider, 24 1-hr. sound recording wire, BC474A complete with power supplies, for 16 mm films, 10x20 beam rotators, ham or photo gear. Meister, 5 Highfield Lane, Nutley, N. J.

WANTED — Coin oper. radios. Advise make and cond. H. D. Vorhaver, 122 S. Main, Chincoteague, Va.

WANTED — Instruction book 08-10-139 for operation and maintenance of Radio Transmitter BC375E. J. P. Hyde, Manassas, Va.

WANTED — 2 station intercom, will trade 10" TV in good order, also have other test equip. NYC area. F. Hellauer, 4135 De Reimer Ave., Bronx 66, N. Y.

FOR SALE — Tape recorder Brush BK-414; Scope Sig. Corps. BC-412B; WE Reproducer 4-A. Locals only. N. I. Wolk, 1411 Avenue N, Brooklyn 30, N. Y.

WANTED — Grunow chassis 12-B model 1291 with spkr., must be in working order. D. W. Sheldon, Del-Bay Apts. Building, R.D. 1, Salem, N. J.

FOR SALE — TV alignment gen., Heathkit model TS-2, literature, perfect cond., completely assembled and factory tested. Freq. 10-230 mc., built in absorption marker., $25. John R. Garner, 320 S. 22nd St., Allentown, Pa.

FOR SALE — Meissner model 8-C FM tuner, walnut cabinet, I.B.'s included, fine shape, $25 FOB. Hal Magargle, 4812 Cooper Lane, Hyattsville, Mo.

FOR SALE — Established radio business with nice small home, right in town. Wonderful chance for TV. MacArthur, 120 N. 1st St., Yucaipa, Calif.

FOR SALE — Teletype printer with table and padded dust cover. Metered conv. with polarized relay. Want used test equip. W. L. Brunner, 318 W. Galer, Seattle 99, Wash.

FOR SALE — EMC model 104 VOM plus HV probe, model HVT, for same. List price for both $35. Will sell for $24. Frank T. Adamo, 2730 Pitkin Ave., Brooklyn 8, N. Y.

FOR SALE — Heath BE-3 battery eliminator, used very little, $22.50; Heath condenser checker $15. Postage paid or COD with ½ deposit on each. Morton's Radio, Box 83, New Ellenton, S. C.

FOR SALE — Three Precision instruments: VTVM EV-10; sig. gen. E-200-C; tube tester 612, all for $200. "Radio-Repair" neon sign free for promptness. John W. White, 403 Sterling Ave., Winona, Miss.

WANTED — Late model Eico or Heath scope. Have Eico 315 sig. gen., exc. cond., RCP 802N tube and set tester. S. Altmann, 65 - 20 Parsons Blvd., Flushing, N. Y.

FOR SALE — Hammarlund HQ 129-X; Harvey - Wells TBS 50C transmitter; Harvey - Wells power supply. $225 for all. George A. Maslyar, 418 Charles St., Plymouth, Ind.

WANTED — Plastic case model RBU-176 Sonora with dial scale. Frank Madden, 21 Stuyvesant Ave., Newark 6, N. J.

SELL OR SWAP — RCA ACR-136 receiver, 550-18000 kc., $25; BC-348-O converted to 110 v. AC, and spkr., $60; Waller 150 w. aircraft transmitter, with tubes, less power, $40; Mon-Key, $25. Need Johnson "Match-Box." A. E. Kimeldorf, 936 Chancellor Ave, Irvington, N. J.

FOR SALE — Harvey - Wells TBS 50-C xmitter; home built power supply, National NC-33 rcvr., carbon hand mike. All in exc. cond. Best offer. Albert LeBel, 50 Walnut Rd., S. Hamilton, Mass.

SELL — RCP model 805B tube and set tester, good cond., $75; Progressive Radio Kit, 15 radios in one, $12. W. G. Bolduc, 10 Brier St., Fitchburg, Mass.

FOR SALE — AC-DC phonomotor, complete with turntable, all speeds, $7.50, rotary type gen. from DC to AC, 300 w. J. Kramer, 229 E. 7th St., New York 9, N. Y.

FOR SALE — RCP model 424A battery operated volts ohms amp tester; ATR inverter 110 DC in, 110 AC out. 325 watts cap. intermittent, 225 watts continuous. V. Vigliana, 70 - 80 Kenmare St., New York 12, N. Y.

FOR SALE — 15 pieces of test equip. All that is needed for AM, FM, TV and auto radio servicing. Vincent Baratta 53 - 05 64th St., Maspeth, L. I., N. Y.

FOR SALE — Standard TV Cascode tuner model TV3109 with tubes, $16; Standard TV tuner, Admiral, part number 94C8-1, like new with tubes (6AG5, 6J6), $6. Mike Peterhans, Pond Farm, Guerneville, Calif.

SELL OR TRADE — Good radio cabinet for Philco console, $10, or will trade for small radio in oper. cond. Also cabinet for Apex, model 10-B, console. Oscar Taylor, Uniontown, Ky.

FOR SALE — Triplett model 630-A; NRI sig. tracer model 33, never used; NRI sig. gen., model 88; Eico battery eliminator and charger, model 1040. All in good cond. and reasonable. Walter E. Niemiec, Carrier 39, Utica P.O., Utica 1, N. Y.

FOR SALE — Two-year-old tube tester, model 3413-A Triplett, A-1 cond., $50, picture tube adapter included. Ernest E. Potvin, R.D. 1, Ives Road, East Greenwich, R. I.

FOR SALE — Tape recorder, 3-way portable radio, 3-speed changer-phono, slide rule, drafting set, books. Sidney Gross, 17 W. 108 St., Shanks Village, Orangeburg, N. Y.

WANTED — Ohmite resistor cabinets (cabinets only). Write stating price, cond., etc. A. S. Cooke, 21 St. Pauls Court, Brooklyn 26, N. Y.

FOR SALE — Precision sig gen., Series E200-C, like new $40. Also Triplett tube tester, model 3413, portable, all metal, like new, $35. $70 for both. C. DePeri, 9 Alabama Ave., Paterson 3, N. J.

WANTED — Sylvania model 220 tube tester, used but must be in good shape. No other make wanted. George Mashek, R.R. 2, Box 45, Marissa, Ill.

SELL OR TRADE — Sig. gen., Heath SG-7, like new. Want model LG-1. M. C. Stutzbach, Box 567, Red Hook, N. Y.

TRADE OR SELL — National short-wave radio, model N.C. 33 4 bands, for Civil Defense FM radio — 30 to 50 Mc. or 152 to 173 Mc. Hy. Knoller, 1590 E. 22 St., Brooklyn 10, N. Y.

FOR SALE — New Philco visual alignment gen., complete with built-in scope. Make offer. Chase Radio, 7 S. 16th St., Richmond, Ind.

FOR SALE — Hickok 610A, like new, $150. Craftsman 4" screw cutting lathe, complete motor, chuck, gears, cutters, like new $40. V. Iavarone, 1218 Leland Ave., Bronx 72, N. Y.

FOR SALE — Signal Corps BC-375-E radio transmitter, including dynamotor, connecting cables and four tuning units. Will sell between $65 and $80., or will trade for newer transmitter. Richard Ebeling, 33 Randolph Rd., White Plains, N. Y.

FOR SALE — Super-Meter, model 670A, A-1 condition. Discontinuing my radio service. First money order for $20 takes it. Also Challenger crystal mike, $3. Frank Bou, 4335 N. 6th St., Phila., Pa.

FOR SALE — Complete radio course by Electronic Institute, Detroit, $35; NRI Service Manual $12; Home Appliance course by Christy $40; other books and radio parts. Travis Heard, 10260 Oakland, Detroit 11, Mich.

FOR SALE — Due to illnes am offering my stock of radio and TV parts at any reasonable price you care to suggest. Send for complete list. Ed Galovic, 96 Egbert Rd., Bedford, Ohio.

FOR SALE — Webster - Chicago wire recorder or will swap for what have you? Charles Grob, Radio-TV Eng., 214 1st Ave. East, Cullman, Ala.

FOR SALE — Precision E. S. 500A scope, used 6 months, $120. Simpson 479 TV sweep and marker alignment gen., $195. Equip. like new, all cables and operator's manuals perf. and clean. Packed and insured. Prices FOB Oakland, Calif. Clifford R. Fox, 3749 Madrone Ave., Oakland 19, Calif.

WANTED — Circuit diagram for BC-AR429, also plug-in coils above 7500 kc. Quote price wanted. O. B. Millar, Coalinga, Calif.

FOR SALE — Photofacts, 101 to 207, $100. Perf. cond. Aulabaugh TV & Appliances, Box 95, Cortland, Ill.

SELL OR SWAP — 16 mm, motor-driven, movie projector with 1700 ft. film, $25. Need battery eliminator, or what have you ?? Robert C. Gelnett, Liverpool, R.D. 2, Pa.

FOR SALE — Manuals on aircraft maintenance such as: Airplane Propellers, Aircraft Sheet Metal Work, etc. Also some NRI booklets. Complete list on request. Louis Porsetsky, 137 - 16 169th St., Springfield Gardens 34, N. Y.

FOR SALE — Vols. 2, 4 and 5 of Official Radio Service Manual by Gernsback in good cond., no pages missing, best offer, FOB, Atlanta. C. Duncan, 338 Candler Rd. SE, Atlanta, Ga.

WANTED — Instruction manual for model 900 Vomax, model 906 sig. gen., other McMurdo-Silver equip. Will pay $1 for each if in good cond. Marvin Feuerborn, Valparaiso Tech. Inst., Valparaiso, Ind.

WANTED — Large tube TV of standard make in trade for Remington 12 gauge Wingmaster 870 deluxe, A-1 cond. Also Mossberg 25A .22 Cal. special target sights. All in fine cond. Oliver Klein, Box 824A, Rt. 11, West Allis, Wis.

FOR SALE — Heathkit tube tester model TC-1 with instruction book, completely wired, $20. Checks large, regular, miniature, octal, loctal, Hytron, 9-pin miniature, pilot lights. Used only a few times. Donald Pope, 26 Virginia Rd., Arlington, Mass.

SELL — Complete Mobile Rig, TBS 50C, PE-103, RME MC-53 (2-6-10M) Converter, Master 10m whip and mount, relay and two handsets. Exc. cond. Will sell separately. Al Valunas, 91 Lynwood Ave., Wilkes-Barre, Pa.

SELL OR TRADE — Supreme model 665 Composite Video gen., Simpson model 485 Cross Hatch generator, A-1 cond. Reasonable cash offer, or trade for used small screen table model TV sets. Electronic Engineers, 4487 E. Tulare St., Fresno, Calif.

FOR SALE — Premier AM sig. gen., model 570, only $40. For N.Y.C. residents only. Theodore Popel, 1223 Elm Ave., Brooklyn 30, N. Y.

FOR SALE — Simpson Crosshatch gen., and Transvision CRT reactivator and tester, Transvision Sparker, Fieler sig. tracer, Jackson RF sig. gen. Perf. cond., 40% off list. Albert Chonka, 816 Richford St., Duquesne, Pa.

WANTED — "Recording and Reproduction of Sound" by Howard W. Sams. Will buy if very cheap, otherwise rent. Wayne Sines, R.R. 1, Box 362, Oakland, Md.

FOR SALE — Tube and set tester, Radio City Products, model 805, good cond. with test leads and instruction book. First $30 takes it. Factory Price $97. L. M. Munger, DeKalb, Ill.

WANTED — Several "old band" FM rcvrs. or tuners. Must be in working cond. and reasonable in price. E. C. Stevens, De Ruyter, N. Y.

FOR SALE — RCA 621 7" TV in good cond., $30; Philco 7" TV, $25; Teletone 7" TV, $25; Teletone 7" TV chassis less all tubes, $10. A. Ignal, 5325 205 St., Bayside 64, L. I., N. Y.

SELL OR SWAP — Wurlitzer juke box, plays 12 single side records. Thoroughly reconditioned, suitable for dance hall or business. Also office intercom. Would like tape recorder or Hi-Fi equip. John's Radio & TV Labs., 199 Olive Ave., Pompton Lakes, N. J.

FOR SALE — Sams folders, Vol. 1-20, Sets 1-200, with binders. Price $175 FOB. Radio Service, 236 Berkshire Ave., Bridgeport, Conn.

SWAP — Have new 1951 Philco auto radio; L. C. Smith typewriter; radio-phono comb. Want camera, TV set. M. Gianfrocco, 1 Bell St., Providence 9, R. I.

FOR SALE — Sams Nos. 67, 79, 93, 113, 118, 124, 126, 133, 135, 148, 158, $1 each; Riders TF No. 40, $1.50; Riders Vol. 10, $5. All for $15. W. F. Mann, 3418 Sunnyside Ave., Brookfield, Ill.

FOR SALE — Heath Scope, model 0-7 (modified to an 0-8), exc. cond. $35. Joseph F. Dineen, 9 Winter Terrace, Westwood, Mass.

FOR SALE — Aerovox model 75, Cap. and Res. bridge, good cond., used, $35; Lyte LTD-5 antenna, used, with extra lucite spacer bars, $20. Charles A. Kohl, 94-96 Furnace St., Kingston, N. Y.

FOR SALE — Hallicrafters S-52; Heathkit scope; TU-7-B tuning unit; BC-459-A transmitter; Radio Altimeter, reasonably priced. Robert G. Pecina, 839 Jersey Ave., Elizabeth 2, N. J.

FOR SALE — BC-348 communications rcvr. with BC-453 Q5'er, $75, local only. Boothroyd, Box 142-G, R.D. 1, Sparta, N. J.

FOR SALE — Riders Manuals 1 thru 12. Brand new cond. George A. Rossetti, Simsbury, Conn.

FOR SALE — 45 rpm RCA record player, PA type, bronzed metal base, $4.50; FM-AM table chassis radio with FM-AM-phono switch, min. tubes, 5" speaker. J. C. Davis, 9014 N. Laramie Ave., Skokie, Ill.

FOR SALE — Custom-built table model mahogany cabinet, drilled for RCA 17" rectangular tube TV, 630 chassis, with mask, safety glass, mounting brackets, back board with cup, in orig. carton $25. Edwin J. Manikowski, 1472 N. Paulina St., Chicago 22, Ill.

SELL OR SWAP — 3-element close spaced folded Dipole Hylite 10-meter beam with mast, thrust bearing, Alliance Tenna Rotor and control box. Used but good cond. $40 cash and carry, or test equip. A. Hellman, 233 Rutledge St., Brooklyn 11, N. Y.

WANTED — Good used AM-FM table model radio, up to 10 tubes, in good cond., for cash. M. M. Odil, 1005 Princeton Ave., Kalamazoo, Mich.

WANTED — Used ICS correspondence courses or miscellaneous ICS lesson texts, any subject. G. R. Crapsi, 251 No. Ellicott St., Williamsville 21, N. Y.

SELL — EV-10A Precision Apparatus VTV with RF-10A probe; United Transformer components S31, S32, S45, S57, S59, S61; capacitors; TJU 10040; Superior 116U Autotransformer. Make offer. R. E. Cocklin, 2202 St. Elmo NE, Canton, Ohio.

TRADE — Brush PL-20 pickup in orig. carton for good micro-groove arm and cartridge. John C. Strole, Box 417, Rutgers University, New Brunswick, N. J.

FOR SALE — Remington-Rand portable typewriter, Vibroplex Bug, both in fine cond.; 813 Transmitter with 200 w. output, needs minute repair. All $100 cash. M. Goldman, 1806 Church Ave., Brooklyn 26, N. Y.

FOR SALE OR TRADE — Radio and electronic components and magazines. O. Zetlmeier, 1123 Woodycrest Ave., New York 52, N. Y.

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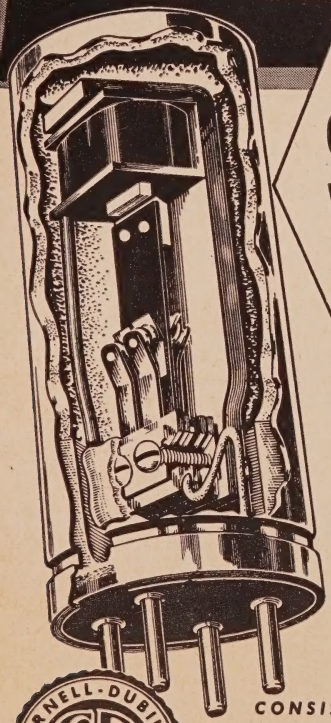

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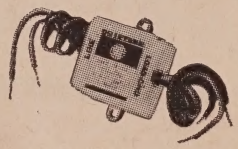
...Sure!  there's a C-D filter just for it!

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